

Understanding Participation rates in post-16 Mathematics and Physics (UPMAP)

Newsletter (Winter 2010/Spring 2011)

UPMAP

UPMAP explores factors that influence post-16 participation in mathematics and physics in the UK. The aim of the project is to identify, through systematic research using a mixture of qualitative and quantitative methods, the interrelation of these factors, taking account of differences between schools as well as between individuals.

Year 10 student interviews: self-concept and perceptions

Interviews with 51 of our students who were a part of the larger attitude survey (circa 23,000 students) highlighted important concerns regarding student perceptions and the self-concept:

- Girls were slightly more likely to have a positive self-concept in mathematics than in physics.
- More students had a negative perception of physics than mathematics.
- Girls more likely to voice a negative perception of physics than of mathematics.
- Students were able to recognise the exchange value of mathematics but only in two cases did students recognise that physics had an exchange value; of these, two students spoke about the exchange value of both mathematics and physics.
- In terms of extrinsic reasons for valuing mathematics and physics there was a key difference between the two subjects when looking at exchange value.

Year 10 student interviews: motivations in mathematics and physics

- The self-concept appears to be influenced (in mathematics) by how well students do in tests. The association students made with mathematics and enjoyment was very rare and in general any association with mathematics was in relation to achievement. This was not a general trend for physics.
- For mathematics and physics, we found that self-concept relates more closely to how the students perceive mathematics as 'relevant to their daily lives' than to perceptions related to merely being positive, negative, exchange value.
- Looking at the relationship between self-concept and exchange value, we found that students with positive self-concepts were more likely to be extrinsically motivated by mathematics and recognise its exchange value in the job and further education market than students who had either negative or mixed mathematics self-concept.
- The exchange value of physics was less relevant to students' perceptions of physics when compared to the findings with mathematics.
- Students who reported that they had a positive self-concept of mathematics/physics were much more likely to have a positive view of mathematics than were those with a mixed or negative self-concept.
- Students in either subject who reported that they had either a negative or mixed self-concept were less likely to report positive perceptions in the subject.

Year 10 student interviews: self-concept and perceptions

Students who were planning on doing mathematics or physics post-16 course were more likely to report extrinsic reasons as the motivation for choosing these subjects compared to other subjects.

For other subjects, intrinsic reasons were more likely to be rated as a reason for wanting to continue with them post-16.

Year 10 student questionnaires

Student questionnaires were designed following a review of the literature considering factors that may influence post-compulsory participation rates. Alongside questions related to intentions to continue to study mathematics and physics post-16, the survey included items to assess attitudes to each subject and to school and teachers, as well as more general potential influences on participation.

Year 10 student questionnaires: the relationship with socio-economic status (as measured by percentage eligible for free-school-meals) of schools and student attitude

- There is a tendency for students in the schools in the higher FSM bands to have higher self-concepts, with those in the 9-13% and 13-21% bands being significantly higher than those in the lower two categories.
- The intrinsic value of physics was higher, regardless of FSM band, than its extrinsic value.
- By contrast the intrinsic value of mathematics was lower (regardless of FSM band) than the extrinsic value.

Year 10 student questionnaires: students' intentions to participate in mathematics and physics

The questions regarding intention to participate in mathematics and, separately, in physics post-16 were coded such that a high score represents strong stated intention to participate. Students were more likely to report that they were intending to study mathematics (18.5% in strong agreement) than physics (8.8% in strong agreement) post-16 (table below).

- More students reported that they did not intend to study physics than mathematics post-16 (21.4% reported strong disagreement about studying physics compared to 11.1% who reported strong disagreement for mathematics).
- In physics, strong agreement in intention to participate is 13.3% for boys and 4.5% for girls.
- In mathematics, the gender bias in intention to participate (measured by strong agreement) is not as large as in physics (22.4% boys versus 15.1% girls).

Samples		Responses (percentages)					
		Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
Mathematics year 10 (n=5321)	Overall results for England sample	11.1	14.2	10.6	22.0	23.6	18.5
	Boys in England	9.3	11.2	9.3	20.9	26.8	22.4
	Girls in England	12.7	16.6	11.9	22.7	20.9	15.1
Physics year 10 (n=5034)	Overall results for England sample	21.4	23.7	13.1	18.9	14.0	8.8
	Boys in England	17.7	18.1	12.7	19.5	18.7	13.3
	Girls in England	24.9	28.7	13.6	18.4	9.9	4.5

Undergraduate student interviews: undergraduates' narratives of choice

What do undergraduates tell us about what directed them to choose their degree subject?

The retrospective views of 50 undergraduates, all of whom were qualified to read STEM subjects yet just about half being actually enrolled on STEM degree courses, were found by interviewing the undergraduates in their first year. The most notable finding so far has been the central importance of key people with whom the undergraduate identifies and who has identification with the subject of study. These key people were teachers, family members or people to whom the undergraduate was attracted. Motivation to study the particular subject was related to the undergraduate's desire to move toward that special person that, in some way, personified the subject of study.

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For more information go to <http://www.ioe.ac.uk/study/departments/gems/4814.html>

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